

What is claimed is:

1. A safety system for a vehicle comprising:

a plurality of discretized patch sensors coupled to a peripheral area of the vehicle and
5 generating at least one collision detection signal; and

a controller coupled to said plurality of discretized patch sensors, determining collision type in response to said at least one collision detection signal and performing at least one countermeasure in
10 response to said collision type.

2. A system as in claim 1 wherein said plurality of discretized patch sensors are at least partially formed of a poly-vinylidene fluoride material.

15 3. A system as in claim 1 wherein said plurality of discretized patch sensors are in a composite form.

4. A system as in claim 1 wherein said plurality of discretized patch sensors are coupled to a
20 bumper of the vehicle.

5. A system as in claim 1 wherein said controller comprises:

a collision contact location estimator determining said collision type, comprising determining
25 collision severity and collision contact location of the vehicle, in response to said at least one collision detection signal; and

a coordinated device activation system performing said at least one countermeasure in response to said collision type.

6. A system as in claim 5 wherein said
5 collision contact location estimator in determining collision severity generates at least one collision severity signal corresponding to at least one collision detection signal.

7. A system as in claim 5 wherein said
10 collision contact location estimator determines collision contact location relative to said plurality of discretized patch sensors in response to values selected from at least one of a plurality of location threshold values, time synchronized comparative
15 magnitude values, and signature values of said collision detection signals.

8. A system as in claim 5 wherein said collision contact location estimator determines collision contact location relative to said plurality
20 of discretized patch sensors in response to at least one collision confirmation threshold value.

9. A safety system for a vehicle comprising:

a plurality of collision detection sensors
25 coupled to a periphery of the vehicle and generating at least one collision detection signal; and

a controller coupled to said plurality of collision detection sensors and comprising;

a collision contact location
30 estimator determining collision type,

comprising determining collision severity and collision contact location on the vehicle, in response to said at least one collision detection signal; and

5 a coordinated activation device performing at least one countermeasure in response to said collision type.

10 10. A system as in claim 9 wherein said plurality of collision detection sensors are in the form of a plurality of discretized patch sensors.

11. A system as in claim 9 wherein said plurality of collision detection sensors are at least partially formed of a poly-vinylidene fluoride material.

15 12. A system as in claim 9 wherein said plurality of discretized patch sensors are in a composite form.

20 13. A system as in claim 9 wherein said plurality of collision detection sensors are non-accelerometer type sensors.

25 14. A system as in claim 9 wherein said collision contact location estimator in determining collision severity generates at least one collision severity signal corresponding to at least one collision detection signal.

15. A system as in claim 9 wherein said collision contact location estimator in determining collision severity generates at least one collision severity signal corresponding to approximately

$K_i V_i (1 - e^{-\tau})$, where V_i is voltage output from the i^{th} collision detection sensor, K_i is an adaptive gain, and τ is an adjustable filter time-constant.

16. A system as in claim 9 wherein said
5 collision location estimator determines collision
contact location relative to said plurality of
collision detection sensors in response to values
selected from at least one of a plurality of location
threshold values, time synchronized comparative
10 magnitude values, and signature values of said
collision detection signals.

17. A system as in claim 9 wherein said
collision contact location estimator determines
collision contact location relative to said plurality
15 of collision detection sensors in response to at least
one collision confirmation threshold value.

18. A system as in claim 17 wherein said
coordinated device activation system performs said at
least one adaptive countermeasure based on the
20 contacted area when said collision confirmation
threshold value is exceeded.

19. A method of determining collision type
and coordinating activation of safety systems of a
vehicle comprising:

25 detecting a collision and generating at least
one collision detection signal;

determining collision severity and collision
contact location onboard the vehicle in response to
said at least one collision detection signal; and

determining collision type in response to said collision severity and said collision contact location.

20. A method as in claim 19 further
5 comprising performing at least one countermeasure in response to said collision type.